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EPA Scientists Conduct Major Study of Lake Ontario

Newest Technology to Track and Map Invading Zebra Mussels Used

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U.S. Environmental Protection Agency scientists will be mapping mussel beds, collecting lake bottom sediments and taking other samples on Lake Ontario in August to continue one of the most comprehensive studies of its kind to determine how the lake's food web has been disrupted and why commercial and sport fish populations are declining. Scientists on the EPA's research vessel, Lake Explorer, will sample 90 sites on the lake during the field trip.

Two open houses are scheduled for the Lake Explorer during the trip. The public is invited to visit the research vessel at open houses at the Lewiston, NY, docks on Sunday, Aug. 22, from Noon to 2 p.m. and Rochester, NY, on Thursday, Aug. 26, from 10 a.m. to Noon at the Port of Rochester docks, Charlotte, NY. Weather factors may result in unexpected cancellation of the open houses. Exhibits on the EPA's Lake Ontario research will be on display and scientists will be on hand to discuss their work.

Over the past six years, EPA's Mid-Continent Ecology research facility in Duluth, MN, has been monitoring the condition of the Great Lakes and assessing the impact of mussels on Lake Ontario. The research facility is part of EPA's National Health and Environmental Effects Research Laboratory in the Office of Research and Development. The current research will provide crucial information on the condition of Lake Ontario's food chain; predict what will happen to the food chain in the future and provide needed data for use by environmental managers to make regulatory decisions to protect the lake's delicate food chain.

Invading zebra and quagga mussels are the major suspects in the disruption of the lake's food chain and may be a factor in the recent declines in predatory, commercially valuable fish like lake trout, and other species, such as slimy sculpin. The mussels are exotic invaders of the lake which have experienced explosive growth in population over the past decades. At the same time, EPA monitoring has shown that some native populations of organisms that live on the lake bottom have decreased dramatically.

During monitoring, EPA scientists have seen a dramatic decline in the abundance of amphipods, tiny shrimp-like invertebrates that are an important food for a wide variety of fish in the Great Lakes. In 1994, a 20 percent decline in the invertebrates that live in bottom sediments was observed, providing the first indication there was a problem. Three years later, the scenario was worse.

"When we came back in 1997, over 43 percent of this benthic invertebrate's population had disappeared. That's a really startling figure," said Dr. Stephen Lozano, Chief Scientist in Duluth and

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project manager for the research. The amphipods' disappearance was surprising because resource

management efforts had led to improvements in water quality. At the same time, some species of fish have also recently declined; for example, adult lake trout numbers reportedly declined by about 65% between 1995 and 1997. The decline in amphipods is one of several possible causes of these reported drops in fish populations.

This summer scientists will continue monitoring with the aid of the latest high tech equipment and begin a more intensive study to better understand why amphipod populations are dropping so dramatically. EPA's new sonar equipment will be used for the first time to develop a map of mussel beds in the lake. The equipment is one of only a dozen in the world.

The research is being done in cooperation with EPA's Region 2 Division of Environmental Planning and Protection in New York City that is responsible for developing and implementing Great Lakes programs for comprehensive and integrated environmental protection activities.

The research on Lake Ontario will be used in efforts to restore the integrity and sustainability of this highly valued ecosystem. It will also provide valuable data and insights that can be used to monitor and assess the condition of Lakes Superior, Michigan and Erie.

"We assume that a lot of research we conduct on Lake Ontario will be applicable to environmental managers addressing the mussel problem in the other three large lakes," Lozano said. "Each lake varies in character and the degree to which zebra mussels are a problem, but the invasion of species that disrupt the food chain represents a common threat to the health of Great Lakes ecosystems."

The zebra and quagga mussels were introduced to the Great Lakes in the late 1980s, having hitched rides on ships coming into the bodies of water. The mussels have rapidly established themselves in most of Lake Ontario's shallow waters. As filter-feeders, the mussels actively strain and eat microscopic phytoplankton from large volumes of lake water, leaving less food available for other, more passive bottom-dwelling organisms.

The research project on Lake Ontario this summer will enable scientists to take a closer look at the dynamics of the lower food chain that includes zooplankton (microscopic animals that are also an important food source for fish), amphipods, and mussels. They will also monitor water conditions and other variables that may play a role in amphipod disappearances.

The study will involve taking samples from about 90 different sites throughout U.S. and Canadian waters of Lake Ontario; the survey will take about 7-10 days on the lake using the EPA's research vessel, Lake Explorer. A crew of 10 will work around the clock in shifts to track and count mussel populations using new sophisticated mapping equipment and take samples of water, sediments and organisms for study in the Duluth laboratories. In September, the Lake Explorer returns to its home port in Duluth. Extensive monitoring studies have also been conducted in Lake Superior, where zebra mussels have not yet become established.

The majority of the Lake Ontario sampling will be conducted near the shore in shallow water (at depths less than 90 meters) where algae blooms develop and provide a nutrient base for amphipods and where mussels are thriving. Scientists will not only do counts of mussels and amphipods, but also measure the health of amphipods by measuring their fat content. Amphipods need a high level of fat to thrive and reproduce.